

THE HIGHLAND MACAQUE OF CEYLON.

BY

W. C. OSMAN HILL, M.D.

(With one text-figure)

For some years I have felt reasonably certain that the Toque monkey (*Macaca sinica*) of the higher altitudes of Ceylon was sufficiently distinct to warrant description as a separate subspecies (*vide* Hill, 1939, p. 144). This statement was based chiefly on personal observations on living specimens from known sources in the higher hills, including some that were living in the writer's private collection from such localities as the Dolosbage Range. The museum material available for the necessary closer observations was, however, insufficient and such as it was appeared to show no great constancy of characters, many of the specimens from neighbouring localities being often intermediate between the already known races of the Toque (*M. s. sinica* and *M. s. aurifrons*).

Recently, through the kind co-operation of the Forest Department of Ceylon, I have had material collected from the uppermost of the three geological terraces of which the land structure of the island is composed, and this proves that the real highland race is the monkey of this terrace and that those from lower or intermediate altitudes are merely annectant forms between the highland form and the lowland races.

I chose an adult male in good coat, collected on the Horton Plains in December 1941, as the type of the new subspecies, which is herewith described.

Macaca (Zati) sinica opisthomelas, subsp. nov.

Size large, but not greatly larger than the lowland forms; limbs and tail relatively short and stout compared to the body length (details below); pelage long and dense; pileum especially exaggerated; general colour of upper parts dusky or greyish olive with bases of hairs almost black; hinder parts and tail with hairs dark grey, almost black, throughout; no rufescence on thighs; under parts scantily clothed with white hairs; cutaneous pigment greatly exaggerated, that in the corium of the ventral skin resulting in a much deeper blue than in lowland forms; the epidermic pigment elsewhere (lip margins, eyelid margins, auricles and palms and soles) also being more concentrated.

Some of the above characters need amplification :—

I. Body proportions.

The following are the flesh measurements of the type male and paratype female of *M. s. opisthomelas*.

TABLE I

Flesh measurements of *Macaca sinica opisthomelas*

	♂	♀
Body weight ...	6122.25 gms. = 13½ lbs.	3401.25 gms. = 7½ lbs.
Crown-rump length ...	456 mm.	426 mm.
Tail length ...	498 mm.	448 mm.
Head length (occiput to most prominent point of muzzle) ...	130 mm.	107.5 mm.
Max. height of ear ...	49 mm.	36 mm.
Tip of tragus to Darwin's tubercle ...	39 mm.	25 mm.
Acromion to olecranon ...	131 mm.	132 mm.
Olecranon to wrist ...	134 mm.	133 mm.
Wrist to dactylion ...	77 mm.	84 mm.
Trochanterion to tibiale ...	143 mm.	117 mm.
Tibiale to heel ...	151 mm.	140 mm.
Length of foot ...	129 mm.	120 mm.
Bimammillary breadth ...	45 mm.	43 mm.
Suprasternale-thelion ...	65 mm.	53 mm.
Thelion-omphalion ...	165 mm.	125 mm.
Omphalion-symphysion ...	147 mm.	102 mm.
Biocular breadth ...	48 mm.	44 mm.
Interocular breadth ...	11 mm.	10 mm.
Nasal breadth ...	20.5 mm.	13 mm.

TABLE II

Somatic Indices of *M. s. opisthomelas* and Lowland Toques

Index	<i>M. s. opisthomelas</i>		Lowland <i>M. sinica</i>		
	Type ♂	Paratype ♀	Av. of 5 ♂♂	Av. of 2 ♀♀	Total av. of 7
Tail index ...	110	103	117.2	118	122.5
Fore limb-trunk index	58.1	62	59.38	66	61.2
Hind limb-trunk index	64.5	60.2	64.7	67.5	65.5
Intermembral index ...	90	96.75	92.3	98	93.9
Humero-radial index	102	100.5	99.6	96.85	97.4
Tibio-femoral index...	105.5	119	109	109.75	109.2
Foot index (i.e. ratio of foot length to hind limb) ...	43.6	46.75	40.5	43.25	41.3

The linear measurements in table I do not indicate a particularly large animal compared with lowland specimens, but by comparing the ratios of the limbs and tail with the trunk, as in Table II a series of important conclusions can be drawn. In the first place the tail forms but 110% of the crown-rump length, which for a Toque monkey is definitely short. Similar indices worked

out from the measurements given by Pocock (1939) for other races of *M. sinica* show proportionately a much longer tail, especially in females. I am not aware what measurement is meant by 'head and body' in Pocock's tables, but it cannot be far different from the one used here (crown-rump) so that the indices are fairly comparable. Allowing for this, the tail index in four adult males of *M. s. sinica* is 125.5, 123, 122 and 107, and in two adult females 131.5 and 131, indicating a longer tail than in the new form, especially in females. (The single anomalous individual with an index of 107 is suggestive of the tail having been incomplete). In *M. s. aurifrons* the average tail index of three adult males is 124 and of four females 121.5, which denotes a tail of similar proportions to that of typical *sinica*.

Similar results accrue from a statistical study of the other appendages, especially the limbs. Thus in the type male of *M. s. opisthomelas* the fore-limb, without the hand, forms 58.1 per cent of the crown-rump length, and the hind-limb, without the foot, 64.5 per cent of the same.

In seven lowland Macaques the fore-limb averaged 61.2 per cent of the crown-rump length and the hind-limb 65.5 per cent.

There is some variation in the intermembral proportions, but the hind-limb is almost invariably longer than the fore-limb (in one female lowland animal only was it less) but in the type of *M. s. opisthomelas* the fore-limb, without the hand, is only 90 per cent of the length of the hind-limb, whilst in the series of lowland Macaques examined it forms 93.9 per cent. The difference seems to be due chiefly to variations in the length of the fore-limb. The tibiofemoral index, which is remarkably constant in the lowland series (109.2) is much less in the highland animal (105.5). There is no significant difference in the proportion of the foot length to that of the rest of the hind-limb.

The differences are not confined to the length ratios, but also affect the girths of the appendages. All are proportionately thicker in *M. s. opisthomelas* than in the other races. The body weight indicates a larger animal than lowland forms. Pocock records 12 lbs. as the largest male of *M. s. sinica*, most of them being smaller; his records of *M. s. aurifrons* are smaller still.

II. Pelage.

1. Length of hairs.

The following measurements indicate the great length of the hairs on the regions stated.

	Type ♂	Paratype ♀
Anterior quadrant of pileum ...	75 mm.	69 mm.
Posterior quadrant of pileum ...	75	85
Lateral quadrant of pileum ...	94	96
Mid-dorsal region ...	75	80
Shoulder ...	70	46
Loins ...	50	34.5
Flank ...	65	49
Dorsum of base of tail ...	32	37
Apex of tail ...	27	12
Lateral aspect of upper arm ...	45-50	24.5
Lateral aspect of thigh ...	30-36	32
Chest ...	40	41
Abdomen ...	40	46

2. Colour of Coat.

Pileum. The general surface colour due to the superficial hairs radiating from the centre of the crown is pale straw colour, but the deeper hairs are darker, dull olive brown at their roots, but paler towards the tip. No contrasting colour occurs in the fore part of the pileum in the male, but it is yellow in the female.

Dorsal aspect of trunk, etc.: colour is darkest over lower thoracic and upper lumbar regions, and the corresponding region of the sides. Here the hairs are for the most part dull grey, darker at their bases, but paling towards their

tips, which present a yellowish tinge, giving a dull olive hue to the area in question. The nape, interscapular, scapular and the hip regions are brighter in colour from the greater degree of flavism of the hair tips, but there is no erythristic tendency in any of these areas. The scapular brightness is continued on to the extensor surface of the arm for a short distance and is not interrupted across the mid-line. It is however, demarcated from the nuchal transverse band by a darker collar on the lower neck. The coxal bright area is sharply separated from its fellow by a very dark area in the mid-line, but laterally it proceeds down the thigh as far as the knee. The tail is almost black on its dorsum and for half its length. It is paler at the sides and in the distal half on the dorsum as well, the flavistic tendency increasing to the tip. The more distal parts of the limbs are clothed with dark grey hairs with pale yellow tips.

Ventral aspect of the trunk, etc.: the under parts are more scantily haired with long white hairs. These also clothe the flexor aspects of the limbs. The white areas are sharply demarcated on the flanks and borders of the limbs from the parts clothed with pigmented hairs. The under surface of the tail has brownish white hairs, darker at the base. Hairs on the buttocks and perineum are very darkly coloured.

Face: this is much more densely haired with downy hairs than in lowland animals. The brows have short bristly hairs, black with straw-coloured tips. The nasal region and cheeks have a pale downy growth mixed with short black bristles. The usual whorl occurs on the preauricular region. It is chiefly composed of pale, almost white, soft hairs, but a few black bristles are mixed with them. There are some long soft white hairs behind the ear.

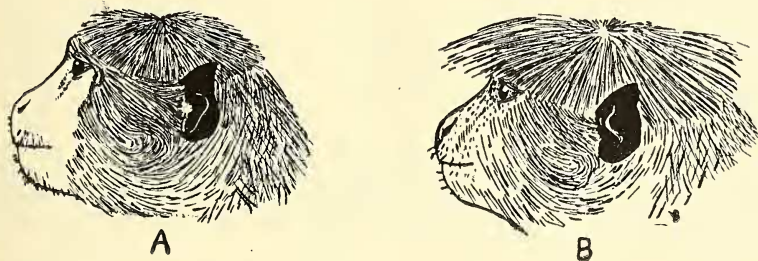


Fig. 1. Side view of head of A, typical Toque monkey (*Macaca s. sinica*) (after Pocock) and B, a highland Toque monkey (*Macaca s. opisthomelas*)

III. Pigmentation of Skin.

The general colour of the skin, both on the well haired and the relatively scantily haired regions is blue, due to pigment in the deeper or connective tissue layer. The blue is much deeper than in typical *sinica* or in *M. radiata*. The scrotum and the skin of the penis are devoid of this pigment and therefore appear pale flesh-colour.

Melanin pigment occurs in the epidermis and gives a blackish colour to the margins of the lips and eyelids and to the whole of the external ear, including the tragus and a few millimetres of the preauricular region. The palms of the hands are brownish-black with some irregular unpigmented patches,—four at the roots of the digits and a fifth on the ulnar 'heel'. The dorsum of the hand is darkly pigmented to beyond the wrist. The foot is similar to the hand, brownish-black on the plantar surface and black on the dorsum, the pigment extending proximally to just beyond the ankle. The nipples are pale flesh-coloured, but there are no pale areas in the axilla or groin.

IV. Skull.

The skull does not indicate a head any larger than that of other races of *M. sinica* according to the figures published by Pocock. The following are the measurements of the type skulls.

TABLE III

Measurements of skull of *M. s. opisthomelas* compared with those of an old male *M. s. sinica*.

	<i>M. s. opisthomelas</i> ♂	<i>M. s. opisthomelas</i> ♀	<i>M. s. sinica</i> old ♂
Cranial capacity ...	70 cc.	72.5 cc.	60 cc.
Total length, prosthion-inion.	112 mm.	93 mm.	108 mm.
Prosthion-basion ...	80 mm.	61 mm.	83 mm.
Glabella-inion ...	81 mm.	71 mm.	79 mm.
Basion-post-nasal spine ...	31 mm.	30 mm.	33 mm.
Max. cranial breadth ...	58.5 mm.	56 mm.	55 mm.
Basion-bregma ...	54 mm.	49 mm.	50 mm.
Bizygomatic ...	78.5 mm.	70 mm.	79.5 mm.
Palatal length ...	50 mm.	31 mm.	52 mm.
Bimaxillary breadth ...	35 mm.	36 mm.	39 mm.
Upper tooth row (excl. canine) ...	28 mm.	27 mm.	29.5 mm.
Foramen magnum breadth ...	14.5 mm.	13 mm.	14 mm.
Foramen magnum length ...	15.25 mm.	15 mm.	14 mm.
Condyllo-symphyseal length ...	77 mm.	63 mm.	84 mm.
Bicondylar breadth ...	60 mm.	44 mm.	61.5 mm.
Lower tooth row (excl. canine) ...	33 mm.	32 mm.	37 mm.
Oblique depth of symphysis menti ...	24 mm.	19 mm.	29 mm.
Transverse diameter of orbit ...	24 mm.	21 mm.	23 mm.
Vertical diameter of orbit ...	21 mm.	19 mm.	19 mm.
Nasal opening, height ...	16.5 mm.	13 mm.	17 mm.
Nasal opening, breadth ...	12 mm.	11 mm.	13 mm.

The following qualitative characters of the type skull are of some interest. The infraorbital foramen is double bilaterally; the supra-orbital nerve occupies a notch on the right and a notch and foramen on the left. The right notch is guarded laterally by a very large bony spicule, itself pierced by a small foramen. The malar foramen is large.

V. Habits.

This monkey inhabits the dense forest of the uppermost terrace which is a dissected plateau, with islands of forest, rising out of lower country. Its range is, therefore, necessarily rather discontinuous.

The type male had its cheek pouches and stomach filled with large round fruits which have been kindly identified for me by the Forest Department as those of the Dambu (*Eugenia Gardneri*).

REFERENCES TO LITERATURE.

- Hill, W. C. O., 1939, *Ceylon J. of Sc.*, xxi, p. 144.
 Pocock, R. I., *Fauna of British India*, Mammals, vol. i, 1939, pp. 34-42.